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(54) **PROTECTIVE WRAPPING DEVICE FOR A CONDENSER TUBE**

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(52) **U.S. Cl.** **165/134.1**; 122/DIG. 13
(58) **Field of Search** 165/134.1; 138/110; 122/DIG. 13

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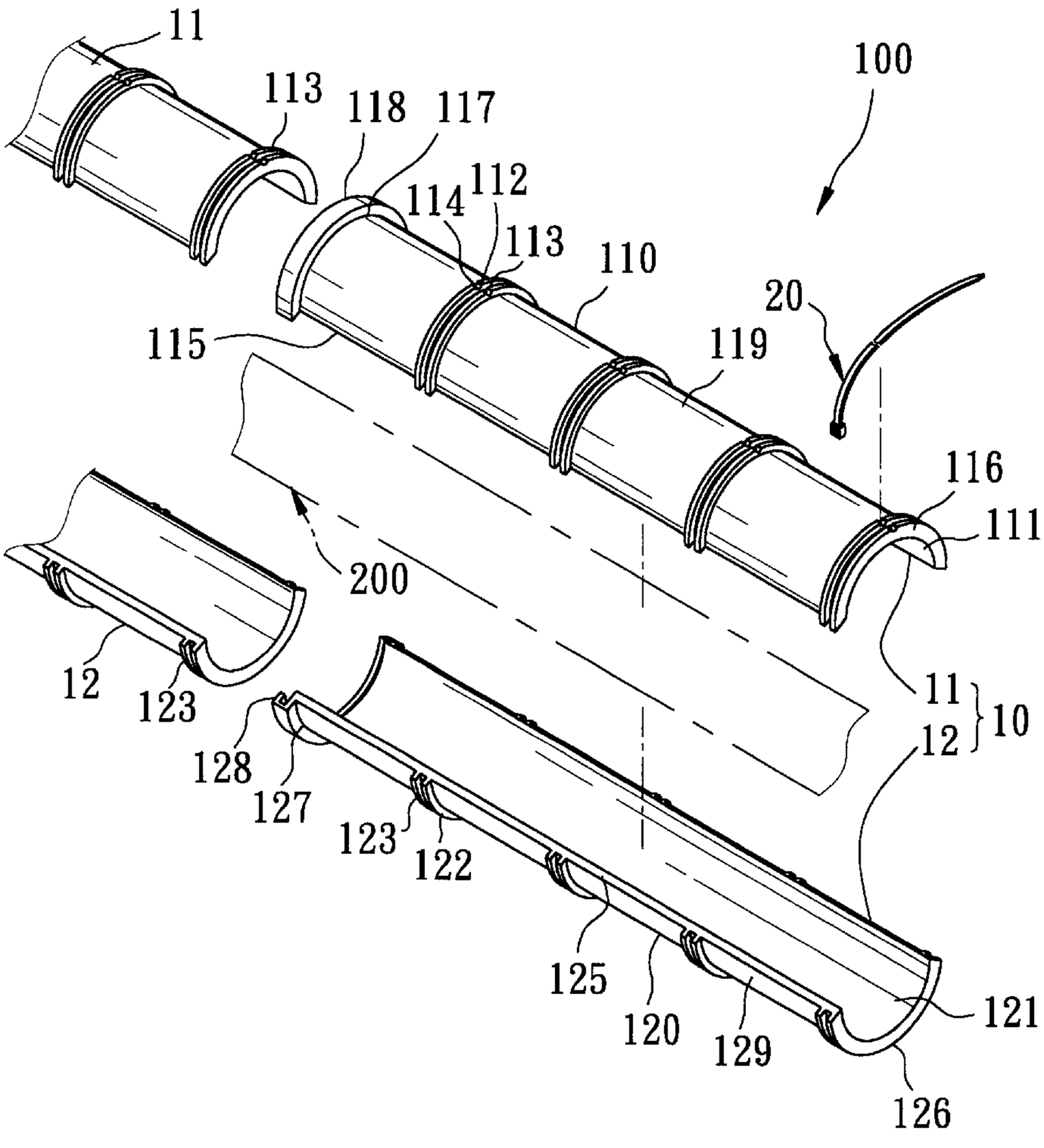
(57) **ABSTRACT**

A protective wrapping device adapted for shielding a condenser tube of a heat exchanger includes two shell walls configured to complementarily mate with each other and to wrap around the tube for heat removal and for preventing formation of water scale on the tube. A plurality of tightening members are disposed to secure the shell walls to the tube. When the tightening members are released from the shell walls, the shell walls can be detached from the tube for cleaning.

5 Claims, 4 Drawing Sheets



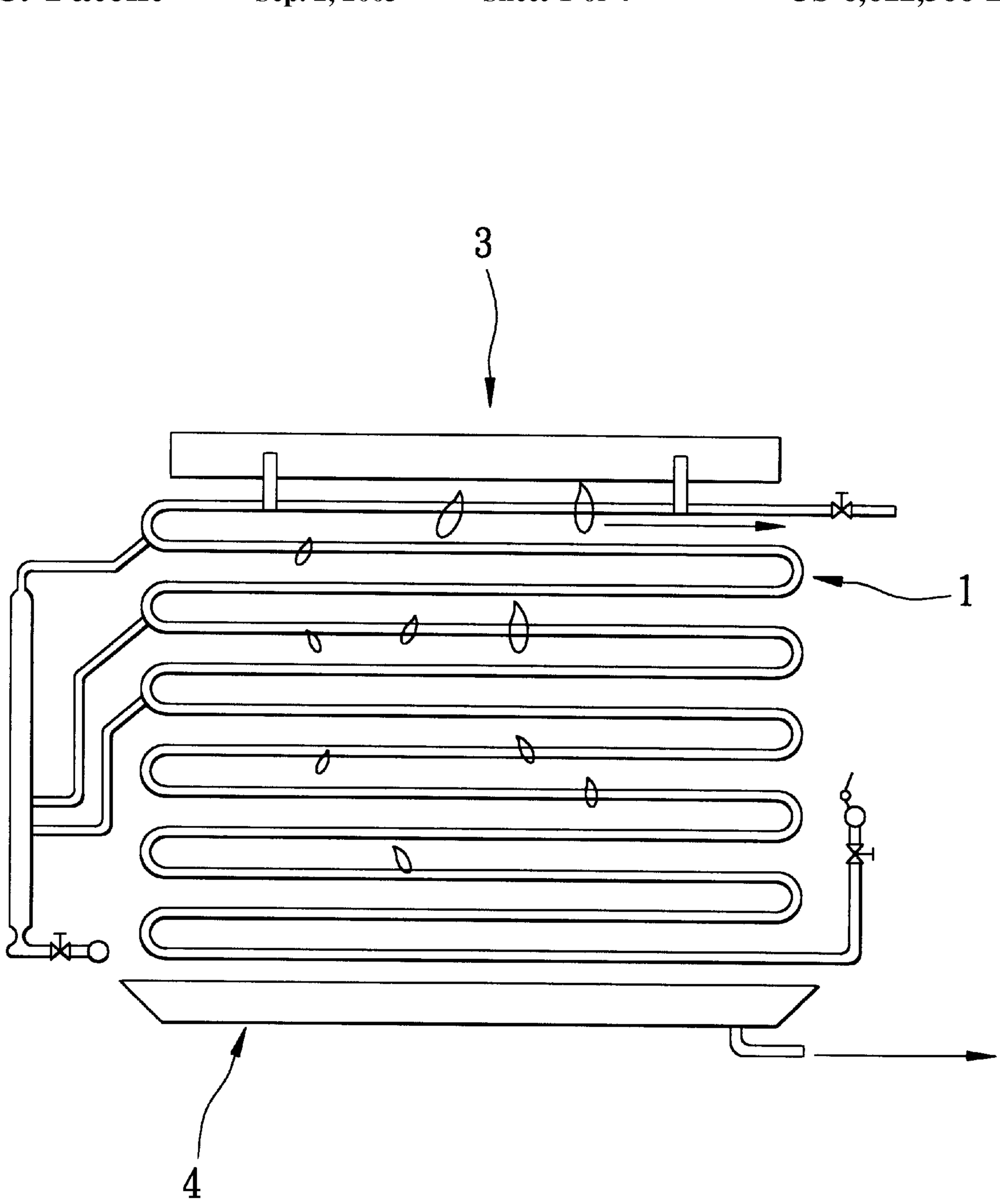


FIG. 1
PRIOR ART

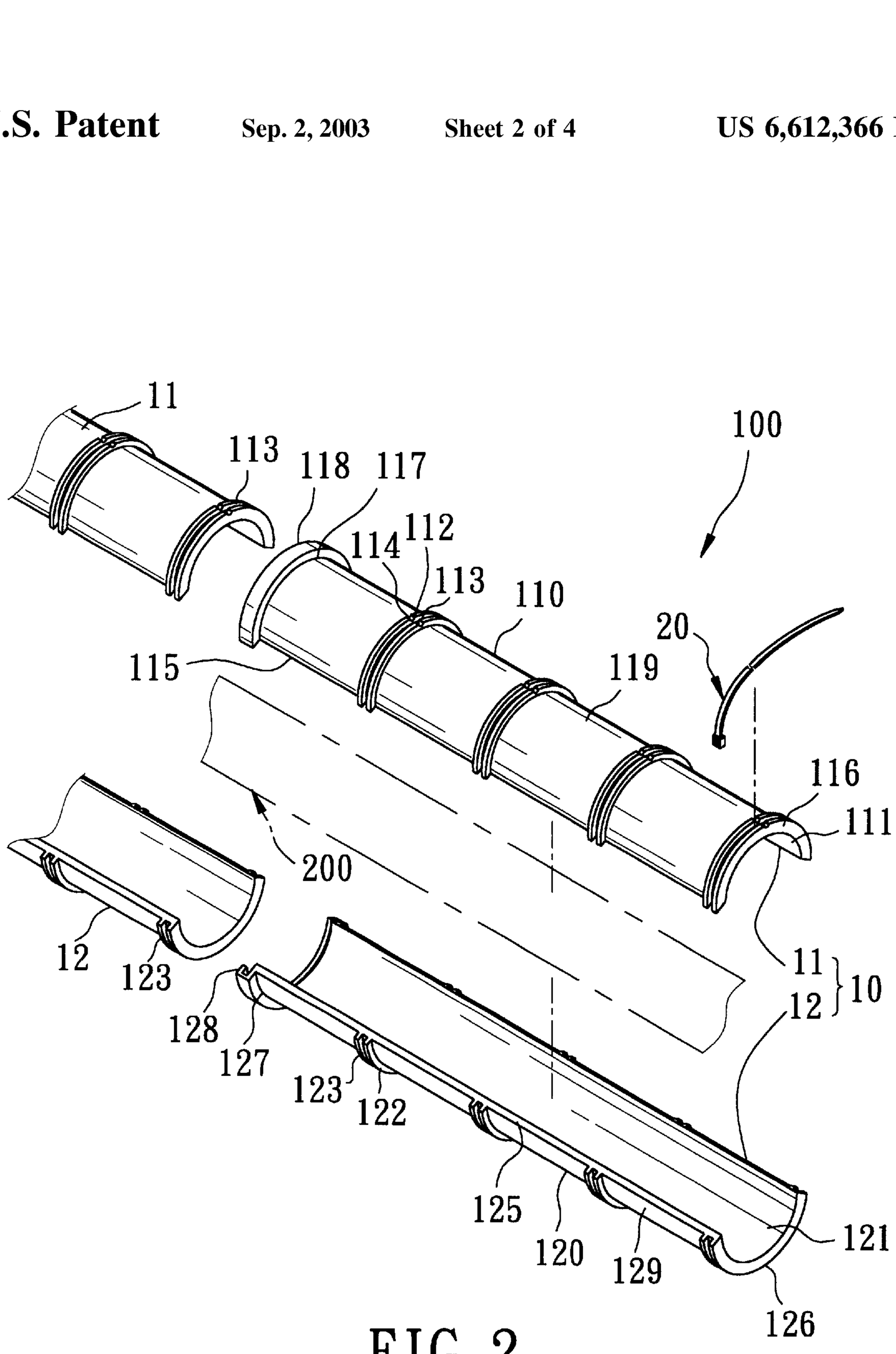

11
113
118
117
100
114
112
113
110
20
115
119
116
111
200
12
123
128
127
123
122
125
120
129
121
11
10
12
126

FIG. 2

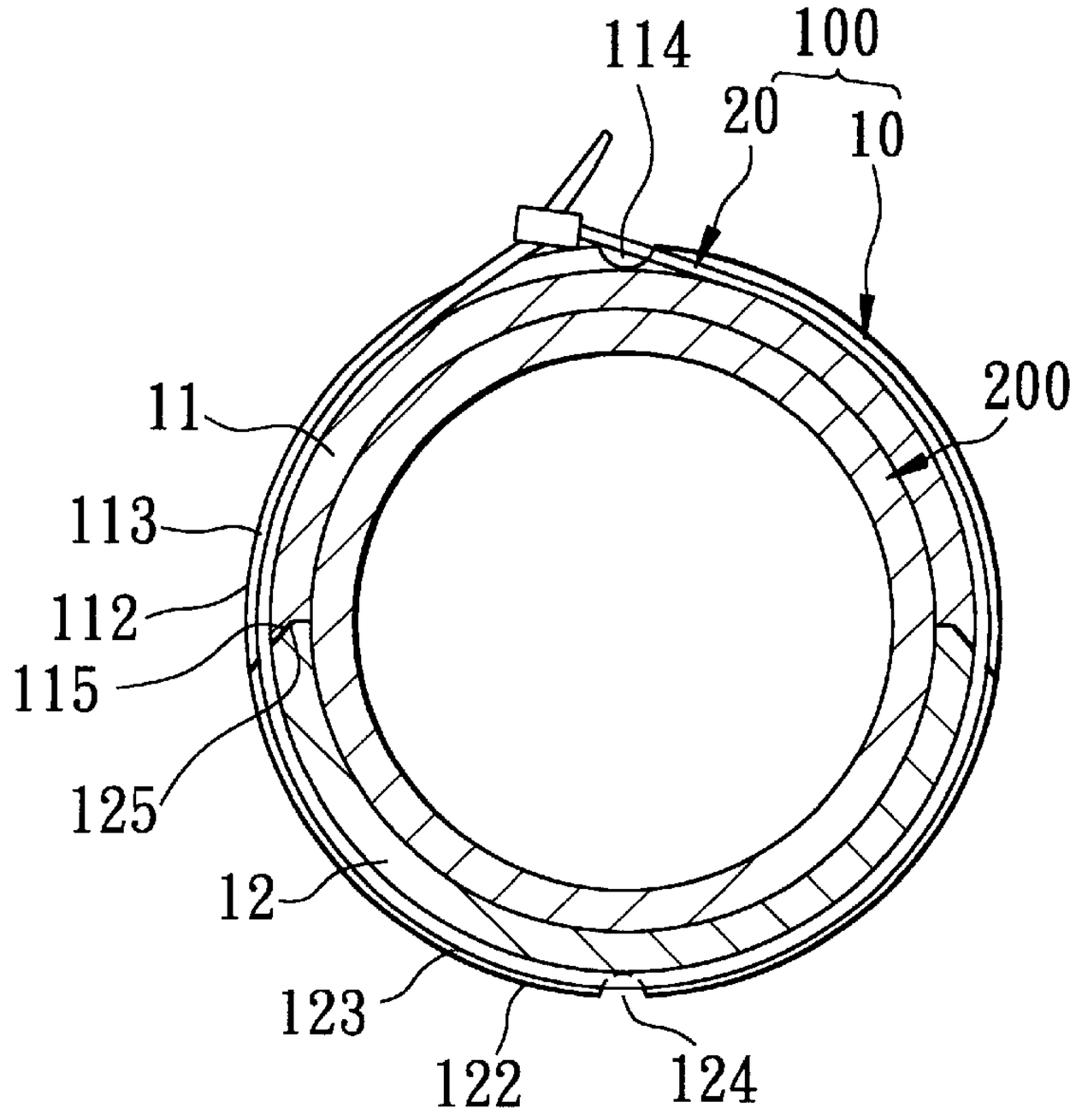

114
100
20
10
200
11
113
112
115
125
12
123
122
124

FIG. 3

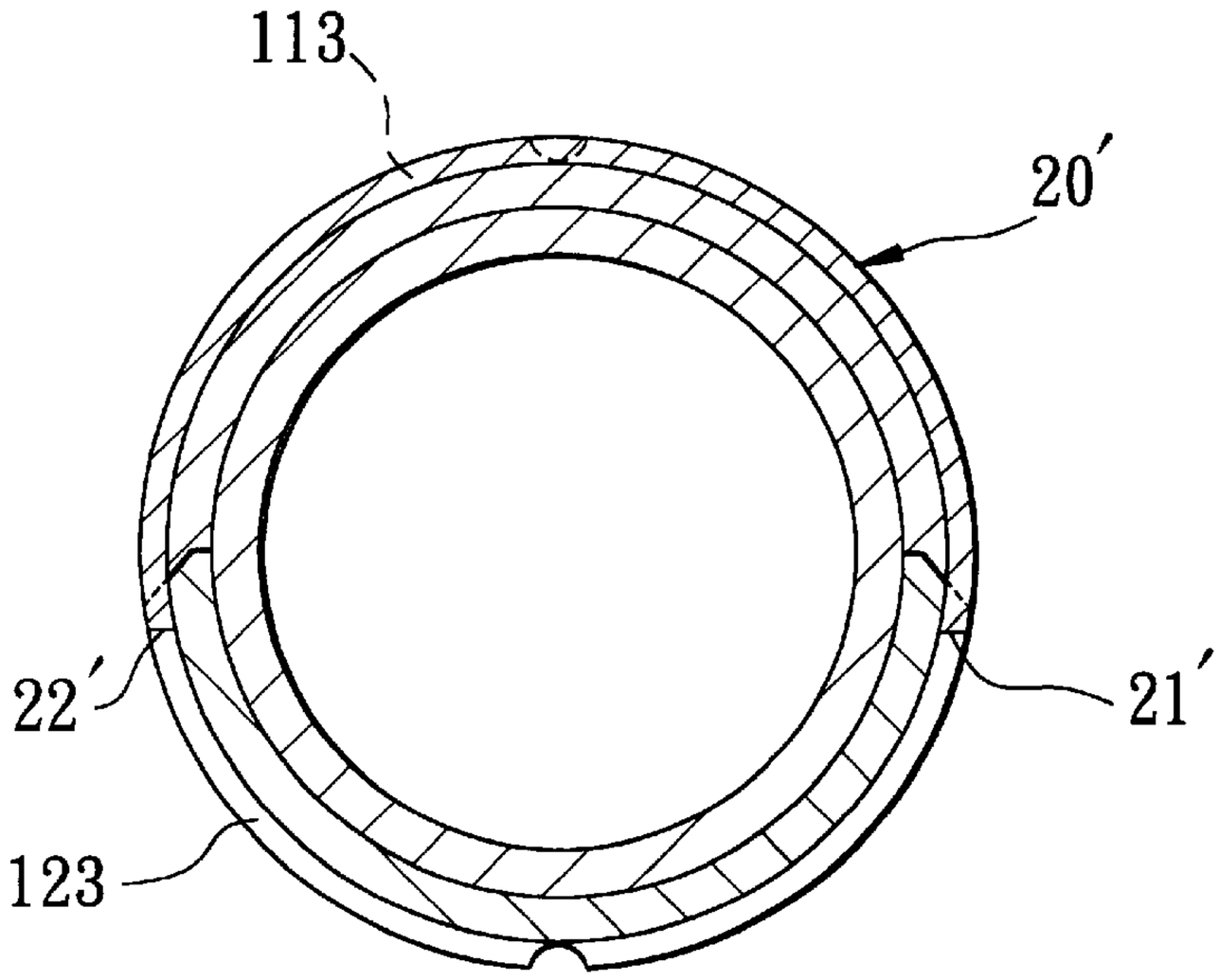

113
20′
22′
21′
123

FIG. 5

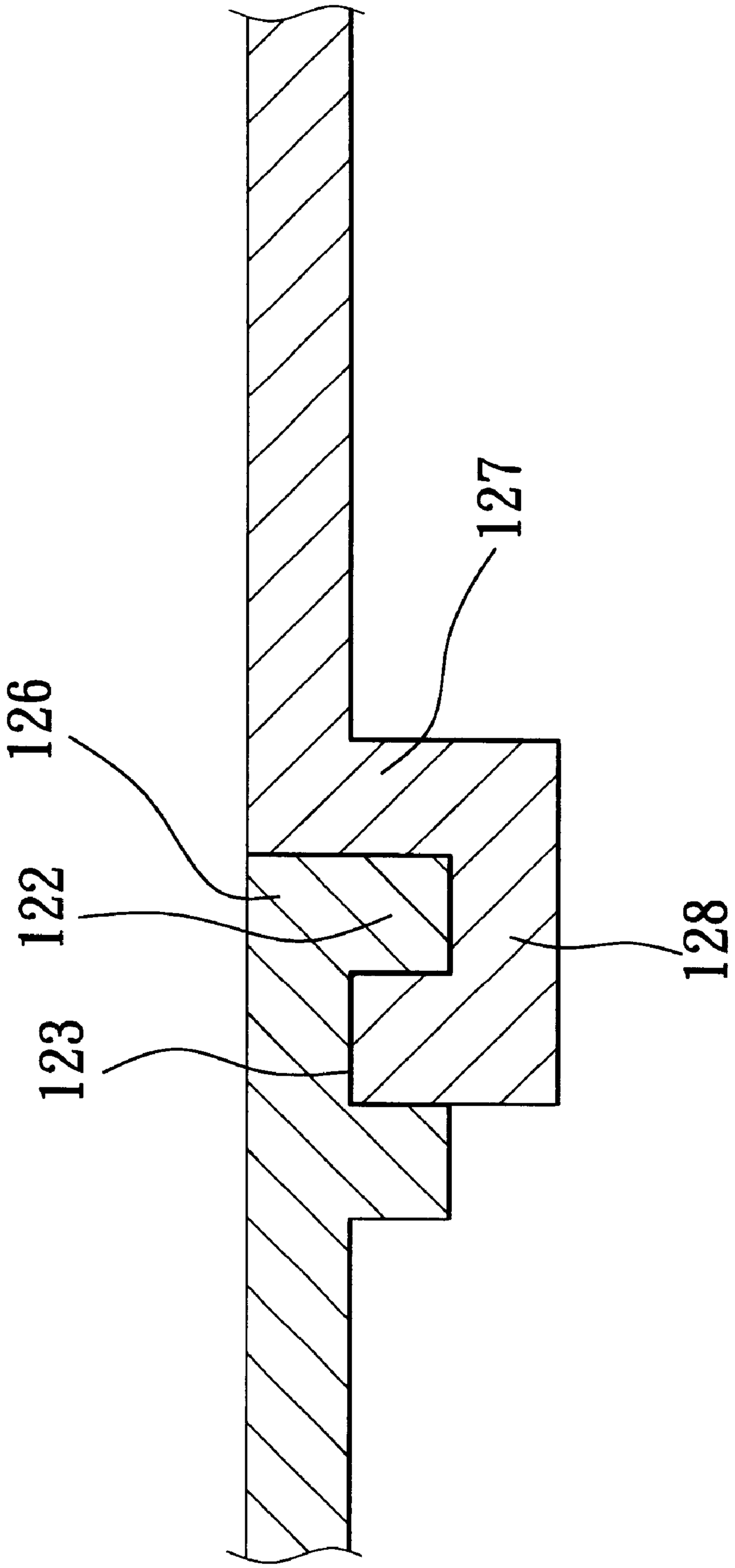


FIG. 4

PROTECTIVE WRAPPING DEVICE FOR A CONDENSER TUBE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a protective wrapping device for shielding a condenser tube of a heat exchanger, more particularly to a protective wrapping device adapted for shielding removably the condenser tube of the heat exchanger which is used in an air conditioning system.

2. Description of the Related Art

Referring to FIG. **1**, a conventional condenser for an air conditioning system is shown to include a zigzag condenser tube **1** for flow of a refrigerant therethrough, and a cooling tower **3** and a water collecting tank **4** which are disposed above and below the tube **1**. Water in the cooling tower **3** falls down for removal of heat of the tube **1** and is collected by the collecting tank **4**. Then, the water can be pumped into the cooling tower **3** for circulation.

Since water scales and the like, which are formed on the outer surface of the tube **1**, will affect adversely the water cooling operation, it is necessary to clean the tube **1** for removing the same. However, the cleaning operation is inconvenient to conduct because of the zigzag shape of the tube.

SUMMARY OF THE INVENTION

The object of the present invention is to provide a protective wrapping device which can be applied to shield a condenser tube of a heat exchanger and which can be removed therefrom for cleaning, thereby prolonging the service life of the condenser tube.

According to this invention, the protective wrapping device includes complementary first and second shell walls made of a heat conductive material. The first shell wall has a first major wall portion which is elongated in an axial direction, which extends about an axis in the axial direction so as to be adapted to wrap around a first outer wall half of a condenser tube, and which terminates at two axially extending first edge surfaces that are spaced apart from each other in a transverse direction transverse to the axial direction. The first major wall portion has first outer and inner wall surfaces which respectively extend about the axis and which are opposite to each other, and a plurality of first grooves which are formed in the first outer wall surface and which are spaced apart from each other in the axial direction. Each first groove extends about the axis and towards the two first edge surfaces. The second shell wall has a second major wall portion which is elongated in the axial direction, which extends about the axis so as to be adapted to wrap around a second outer wall half of the condenser tube, and which terminates at two axially extending second edge surfaces that are spaced apart from each other in the transverse direction. Each second edge surface is configured to complementarily mate with a respective one of the first edge surfaces so as to define a receiving chamber between the first and second shell walls for receiving fittingly the condenser tube. The second major wall portion has second outer and inner wall surfaces which respectively extend about the axis and which are opposite to each other, and a plurality of second grooves which are formed in the second outer wall surface and which are spaced apart from each other in the axial direction. Each second groove extends about the axis and towards the second edge surfaces, and is registered with

a respective one of the first grooves when the first and second shell walls mate with each other so as to bring the first and second grooves in a looped line. Each of a plurality of tightening members is inserted into a registered pair of the first and second grooves along the looped line to tighten the first and second shell walls to each other so as to secure the first and second shell walls to the condenser tube.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiments of the invention, with reference to the accompanying drawings, in which:

FIG. **1** is a schematic view of a conventional condenser for an air conditioning system;

FIG. **2** is an exploded perspective view of a preferred embodiment of a protective wrapping device according to this invention;

FIG. **3** is a cross-sectional view of the preferred embodiment;

FIG. **4** is a sectional view showing how two adjacent shielding members of the preferred embodiment are interconnected; and

FIG. **5** is a cross-sectional view of another preferred embodiment of this invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. **2** and **3**, the preferred embodiment of the protective wrapping device **100** according to the present invention is shown to comprise at least one shielding member **10** and a plurality of tightening members **20**. Each shielding member **10** includes complementary first and second shell walls **11**,**12** which are made of a heat conductive material, such as aluminum.

The first shell wall **11** has a first major wall portion **110** which is elongated in an axial direction, which extends about an axis in the axial direction so as to wrap around a first outer wall half of a condenser tube **200**, and which terminates at two axially extending first edge surfaces **115** that are spaced apart from each other in a transverse direction transverse to the axial direction. The first major wall portion **110** has first outer and inner wall surfaces **119**,**111** which respectively extend about the axis and which are opposite to each other. A plurality of first grooves **113** are formed in the first outer wall surface **119** and are spaced apart from each other in the axial direction. Each first groove **113** is confined by two protrusions **112**, and extends about the axis to reach the two first edge surfaces **115**. In addition, a plurality of first cutting notches **114** are formed in the first outer wall surface **119** and are disposed transverse to the first grooves **113**, respectively.

The second shell wall **12** has a second major wall portion **120** which is elongated in the axial direction, which extends about the axis so as to wrap around a second outer wall half of the condenser tube **200**, and which terminates at two axially extending second edge surfaces **125** that are spaced apart from each other in the transverse direction. The second major wall portion **120** has second outer and inner wall surfaces **129**,**121** which respectively extend about the axis and which are opposite to each other. A plurality of second grooves **123** are formed in the second outer wall surface **129** and are spaced apart from each other in the axial direction. Each second groove **123** is confined by two protrusions **122**, and extends about the axis to reach the two second edge surfaces **125**. A plurality of second cutting notches **124** are

formed in the second outer wall surface **129** and are disposed transverse to the second grooves **123**, respectively. Each second edge surface **125** is configured to complementarily mate with the respective first edge surface **115** so as to define a receiving chamber between the first and second shell walls **11,12** for receiving fittingly the condenser tube **200**. Further, each second groove **123** is registered with the respective first groove **113** so as to bring the corresponding first and second grooves **113,123** in a looped line.

Each tightening member **20**, in this preferred embodiment, is a plastic tightening band, and is inserted into a registered pair of the first and second grooves **113,123** to surround the looped line. Two ends of the tightening band **20** can be tied to each other so as to tighten the first and second shell walls **11,12** to each other, thereby securing the same to the condenser tube **200**.

As such, the first and second shell walls **11,12** can be wrapped around the condenser tube **200** for protecting the condenser tube **200** from dust and for heat removal purposes.

Further, each first shell wall **11** has a first right end **116** in which one first groove **113** is formed, and a first left end **117** which is provided with a protrusion **118** that extends about the axis to reach the two first edge surfaces **115**. Thus, the protrusion **118** can be inserted into a corresponding first groove **113** in the first right end **116** of an adjacent first shell wall **11**. Similarly, as shown in FIG. **4**, each second shell wall **12** has a second right end **126** in which one second groove **123** is formed, and a second left end **127** which is provided with a protrusion **128** that extends about the axis to reach the two second edge surfaces **125**. Thus, the protrusion **128** can be inserted into a corresponding second groove **123** in the second right end **126** of an adjacent second shell wall **12**.

Preferably, the first and second edge surfaces **115,125** are inclined from the first and second inner wall surfaces **111,121** toward the first and second outer wall surfaces **119,129**, respectively, such that water condensate, which falls down due to gravity, can be prevented from penetrating between the first and second inner wall surfaces **111,121**.

When it is desired to remove the protective wrapping device **100** from the condenser tube **200** for cleaning the former, the tightening bands **20** can be cut by a cutting tool (not shown) extended through the cutting notches **114,124**. The first and second shell walls **11,12** can be easily removed and separated from each other. New tightening bands **20** can be used to tighten the first and second shell walls **11,12** once again to each other in order to secure the shell walls **11,12** to the condenser tube **200**.

As shown in FIG. **5**, an alternative construction of the tightening member **20'** is shown to be in the form of a metal C-shaped ring which includes a jaw portion that is insertable into the respective first groove **113**. The jaw portion has two jaw ends **21',22'** which are biased toward each other in the transverse direction. Thus, when the jaw portion is inserted into the respective first groove **113**, the jaw ends **21',22'** extend respectively beyond the first edge surfaces **115** and abut firmly against the second outer wall surface **129** in the respective second groove **123**.

While the present invention has been described in connection with what is considered the most practical and preferred embodiments, it is understood that this invention is not limited to the disclosed embodiments but is intended to cover various arrangements included within the spirit and scope of the broadest interpretations and equivalent arrangements.

I claim:

1. A protective wrapping device adapted for shielding a condenser tube which has a passage extending along an axis for flow of a refrigerant therethrough, and first and second outer wall halves respectively extending in an axial direction parallel to the axis and formed integrally with each other to confine the passage, said device comprising:

a first shell wall made of a heat conductive material, and having a first major wall portion which is elongated in the axial direction, which extends about the axis so as to be adapted to wrap around the first outer wall half of the condenser tube, and which terminates at two first edge surfaces that are spaced apart from each other in a transverse direction transverse to the axial direction, each of said first edge surfaces extending in the axial direction, said first major wall portion having first outer and inner wall surfaces respectively extending about the axis and opposite to each other, and a plurality of first grooves formed in said first outer wall surface and spaced apart from each other in the axial direction, each of said first grooves extending about the axis and towards said two first edge surfaces;

a second shell wall made of a heat conductive material, and having a second major wall portion which is elongated in the axial direction, which extends about the axis so as to be adapted to wrap around the second outer wall half of the condenser tube, and which terminates at two second edge surfaces that are spaced apart from each other in the transverse direction, each of said second edge surfaces extending in the axial direction and being configured to complementarily mate with a respective one of said first edge surfaces so as to define a receiving chamber between said first and second shell walls for receiving fittingly the condenser tube, said second major wall portion having second outer and inner wall surfaces respectively extending about the axis and opposite to each other, and a plurality of second grooves formed in said second outer wall surface and spaced apart from each other in the axial direction, each of said second grooves extending about the axis and towards said second edge surfaces, and being registered with a respective one of said first grooves when said first and second shell walls mate with each other so as to bring said first and second grooves in a looped line; and

a plurality of tightening members, each inserted into a registered pair of said first and second grooves along the looped line to tighten said first and second shell walls to each other so as to secure said first and second shell walls to the condenser tube.

2. The protective wrapping device of claim **1**, wherein each of said tightening members is a plastic tightening band which is inserted into the registered pair of said first and second grooves and which surrounds said first and second outer wall surfaces about the axis to permit two ends thereof to be tied to each other.

3. The protective wrapping device of claim **1**, wherein each of said tightening members is a metal C-shaped ring including a jaw portion which is configured to be insertable into the respective one of said first grooves, and which has two jaw ends that are biased toward each other in the transverse direction such that when said jaw portion is inserted into the respective one of said first grooves, said jaw ends extend respectively beyond said first edge surfaces and abut firmly against said second outer wall surface in the respective one of said second grooves.

4. The protective wrapping device of claim **1**, wherein said first shell wall has first right and left ends opposite to

each other in the axial direction, one of said first grooves being formed in said first right end, said first left end being provided with a protrusion which extends about the axis towards said two first edge surfaces,

said second shell wall having second right and left ends opposite to each other in the axial direction, one of said second grooves being formed in said second right end, said second left end being provided with a protrusion which extends about the axis towards said two second edge surfaces,

whereby, adjacent ones of said protective wrapping devices can be interconnected by engaging said protrusions on said first and second left ends of said shell walls of one of said protective wrapping devices into said first grooves in said first and second right ends of said shell walls of another of said protective wrapping devices.

5. The protective wrapping device of claim **1**, wherein said first and second edge surfaces are inclined from said first and second inner wall surfaces toward said first and second outer wall surfaces respectively such that water condensate, which falls down due to gravity, can be prevented from penetrating between said first and second inner wall surfaces.

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